

JPRS 74494

1 November 1979

Worldwide Report

EPIDEMIOLOGY

No. 162



FOREIGN BROADCAST INFORMATION SERVICE

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REPORT DOCUMENTATION PAGE		1. REPORT NO. JPRS 74494	2.	3. Recipient's Accession No.
4. Title and Subtitle WORLDWIDE REPORT: EPIDEMIOLOGY, No. 162			5. Report Date 1 November 1979	
7. Author(s)			6.	
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201			8. Performing Organization Rept. No.	
12. Sponsoring Organization Name and Address As above			10. Project/Task/Work Unit No.	
			11. Contract(C) or Grant(G) No. (C) (G)	
15. Supplementary Notes			13. Type of Report & Period Covered	
			14.	
16. Abstract (Limit: 200 words) This serial report contains worldwide press and radio coverage of incidence, outbreak, and other aspects of human, animal, and plant diseases, insect pests and control, sanitation conditions, immunization and public health programs.				
17. Document Analysis & Descriptors Worldwide Clinical Medicine Environmental Biology Hygiene and Sanitation Microbiology b. Identifiers/Open Ended Terms c. COSATI Field/Group 2E, 6E, 6F, 6I, 6M				
18. Availability Statement Unlimited Availability Sold by NTIS Springfield, Virginia 22161		19. Security Class (This Report) UNCLASSIFIED		21. No. of Pages 39
		20. Security Class (This Page) UNCLASSIFIED		22. Price

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BRIEFS

WORKSHOP ON BILHARZIA--Blantyre--A 4-day workshop on control of bilharzia disease in East, Central and Southern Africa started in Blantyre on Monday. The workshop, grouping doctors, economists, health administrators, and research scientists from Mauritius, Botswana, Lesotho, Kenya, Uganda, Tanzania, Seychelles, Swaziland, Zambia and Malawi aims at coordinating strategy towards eradicating the disease in the region. It has been organized by the Commonwealth regional health secretariat, which is based in Arusha, Tanzania. [Text] [Addis Ababa THE ETHIOPIAN HERALD in English 12 Sep 79 p 8]

NEAR-EPIDEMICS REPORTED--An international Red Cross team reported yesterday a near-epidemic of measles and high rates of tuberculosis, rabies and venereal disease in south-west Uganda. A Red Cross spokesman said most medical stations had very few medicines and no vaccines. [Text] [Nairobi DAILY NATION in English 27 Oct 79 p 28]

CSO: 5400

AUSTRALIA

BRIEFS

INCREASE IN MALARIA--Sydney.--The incidence of malaria in Australia has risen during the past few years, according to figures released by the New South Wales Health Commission yesterday. The commission's adviser on communicable diseases, Dr. Peter Christopher, said the number of malaria cases reported rose from 201 in 1974 to 307 in 1978. [Text] [Melbourne THE AGE in English 1 Sep 79 p 3]

CSO: 5400

BRIEFS

CHOLERA OUTBREAK--Bujumbura, 4 Oct--Local health officials in the small Central African country of Burundi announced today that cholera has reappeared in the country, and more specifically in the capital of Bujumbura and its suburbs. There have been 47 cases of the illness, none of them fatal. An epidemic in April-May 1978 was controlled and at the present time measures to control and prevent this disease are being adopted. Cholera remains endemic in the western part of Burundi and the eastern region of Zaire. [Text] [Maputo NOTICIAS in Portuguese 5 Oct 79 p 3]

CSO: 5400

INSTANCES OF MALARIA, MEASLES FOUND

Spread of Malaria

Yaounde CAMEROON TRIBUNE in French 20 Jun 79 p 7

[Article: "The New Doctor's Task Is To Fight Against Malaria"]

[Excerpts] Mr Tchinda Marc, prefect of Nyong-et-Kelle in the Central South-Province, presided over a ceremony installing Dr Kanwa Mathieu as new chief of the Service of Preventive and Rural Medicine of the Department of Nyong-et-Kelle, a post formerly held by Dr Abessolo.

Turning to Dr Kanwa, Mr Tchinda presented him with the Department's Section of Preventive and Rural Medicine, a vast structure under his direction.

He also mentioned that the Department of Nyong-et-Kelle is a hotbed of malaria of the falciparum type, of filariasis, and of "gonococci" which are spreading at a rather disturbing rate in the youth.

Measles have recently been the cause of numerous deaths in areas farthest from medical facilities.

Immunization Against Measles

Yaounde CAMEROON TRIBUNE in French 31 Jul 79 p 7

[Text] In an effort to reduce the rate of infant deaths in the department, directors of hospital centers have continued practicing preventive measures. One such effort is the free vaccination campaign against measles organized each year in the Bamoutos in West Province. A similar campaign has just started across the Department by the Ad Lucem de Mbouda Hospital. The Prefect of Bamoutos presided over the preparatory work of this campaign on 4 July 1979 in the hall of Party Headquarters at Mbouda.

Dr Bracher, chief physician of the Ad Lucem Hospital described the symptoms of measles to the campaign participants. As a review, the physician gave each participant a document explaining the vaccination procedures against that disease. The document provided answers to many of the questions that would later have arisen.

The chief of the Center of Preventive Medicine of Bamboutos promised his active cooperation for the success of this campaign.

During his address, Mr Richard Mota, prefect of Bamboutos, expressed great satisfaction in the work the Ad Lucem Hospital accomplished in its periodical vaccination campaign against measles.

The prefect asked the subprefects and traditional local heads that a large diffusion campaign be made in their administrative staffs in order that the vaccination program be completely successful.

In addition, if there are numerous resources for fighting against the spread of diseases, then other campaigns for detecting ~~leprosy~~ should also be undertaken.

9128

CSO: 5400

BRIEFS

MODERNIZATION OF HEALTH FACILITIES--According to Herbert Erler, deputy minister for health, the GDR will increase considerably by 1985 the performance standards of its public health system which, in some cases, is obsolete and understaffed. In this connection, according to Erler, "highest priority" is to be given to the improvement of those areas of inpatient and outpatient care which are most frequently used. The number of physicians and nurses is to be noticeably increased in the hospitals. By 1985, as part of an extensive new construction program, about 12,000 new hospital beds will be available to replace obsolescent equipment. With respect to outpatient care, plans call for closing gaps still existing in health care, especially in large cities and areas of industrial concentration. In addition, the shortage of dentists is to be alleviated by the establishment of new dental-care facilities, including dental laboratories. [Excerpt] [Bonn IWE-TAGESDIENST in German No 155, 11 Oct 79 pp 3-4]

CSO: 5400

BILHARZIASIS CASES REPORTED ON THE INCREASE

Zurich NEUE ZUERCHER ZEITUNG in German 18 Sep 79 pp 27-28

[Article by Franz Perabo: "Bilharziasis--Increase of a Worldwide Pestilence; Economic Aspects and Advances in Therapy"]

[Text] Theodor Bilharz (born 1825 in Sigmaringen) had already reached the peak of his scientific career at age 26 without suspecting that he had introduced a new era of tropical parasitology with the discovery of *Distomum haematobium* and the complete description of the disease named after him (also known as schistosomiasis). At age 37 he died of typhoid in Cairo. The amount of disease and economic losses suffered by man over the millennia from this parasitosis which is second only to malaria in severity (*schistosoma* eggs were found in the kidneys of mummies of the XX Dynasty, 1184-1087) can be measured from the fact that today, in Egypt, the annual loss of working potential caused solely by this "scourge of Allah" is calculated to be about 900 million [Swiss] francs. According to estimates by WHO, about 200 million people suffer from this pestilence. It is the peculiarity of modern technical progress that, as modern irrigation systems and reservoirs are built, especially in Africa, schistosomiasis conquers new territories in the same measure and makes the concept of advance questionable. According to a spokesman for WHO: "It appears as if the water snails which spread schistosomiasis and the engineers who construct irrigation systems would have the same views on ideal conditions."

Widespread Epidemiological Picture

The three main groups of schistosomiasis are caused by agents (*S. haematobium*, *S. mansoni*, *S. japonicum*), which are clearly distinguishable from one another on the basis of biological characteristics, separate geographical distribution and distinct consequences of the disease.

S. haematobium is present throughout Africa, in the Near East, in Southwestern India, on Cyprus, Mauritius and Madagascar, and in individual herds in Southern Spain and Southern Portugal. *S. mansoni* is also located in a broad area of Africa, above all also in Egypt. Thereby this country is turned into a stronghold of schistosomiasis, with 40 percent of the population being afflicted with a latent or manifest form of the disease.

The mansoni type can also be found in Brazil, Venezuela and on the Great and Small Antilles. *S. japonicum* is endemic in the Far East--on a few Japanese islands (Honshu, Kiushu), in Thailand, Laos, Cambodia, on the Philippines, on Celebes and in several provinces of China. In the so-called substitute reservoirs, it also occurs in horses, donkeys, monkeys, cats and rodents. The less well known *S. intercalatum* (Congo, Gabon, Cameroon) seems to infest animals more than man. Known to veterinary medicine, *S. bovis* and *S. mattheei* play only a minor role in man. In 1977 and 1978, seven cases of *S. mansoni* and three cases of *S. haematobium* were diagnosed each year in the Tropical Institute of Basel, Switzerland. Final statistics on this disease from other laboratories are not available.

Complex Processes in Its Transmission

The schistosoma eggs excreted through the urine and feces of infected humans develop in fresh water (never in salt water) into miracidia. Because of their short lifespan, in the interest of further development, they have to find as fast as possible the water snail corresponding to their type (for example, *B. Bulinus truncatus* for *S. haematobium*, *Biomphalaria alexandrina* for *S. mansoni*, *Oncomelania nosophora* for *S. japonicum*.) The snails prosper best with sufficient sunlight, water temperatures between 22-23° C and flow velocity of about 30 cm/sec. In the deep shadows of dense tropical rain forests, at tropical elevations above 1800 meters and in torrential creeks snails do not settle.

Within their hosts the miracidia develop into sporocysts and, via numerous daughter sporocysts, they mature into the cercaria or tailed larvae in about 4 to 7 weeks. These are dangerous to man. Before the infected snail is destroyed, it excretes several thousand cercaria daily. Children are enthusiastic swimmers and puddles and river banks are their favorite places for exercise. Therefore they are the ones most exposed to an attack by cercaria. Schistosomiasis is therefore mainly a disease of children, the age groups from 7 to 15 years having the highest rate of infection. Since personal hygiene is only a learning process in children, they also tend to infect the waters. A child with schistosoma excretes up to 1,500 eggs per gram of feces. Other transmission possibilities are presented by cleaning household articles at riverbanks and in ponds (laundry, dishes), during the few steps in water to and from boats and by the ritualistic cleansing of Moslems before prayer. In stored water, the cercaria are destroyed after about 60 hours.

Using glandular secretions, the cercarium will burrow itself into the skin in less than 15 minutes, casting off its forked caudal fin. Over the lymphatic and venous tracts, it will reach the right side of the heart and the lungs and, after about 48 hours, it will get into the portal circulation. Here, at its destination, it develops in 2 to 8 weeks into up to 2 cm long paired flukes or schistosoma. During copulation the female places itself into the slit (schisto) or abdominal groove of the male.

The thin worm fits well into the venous lumen. By means of a suction cup, it attaches itself to the vessel wall, resists the blood stream and feeds itself on erythrocytes. Egg production is enormous especially by *S. japonicum*. During her lifetime of 3 to 8 years (maximum up to 30 years), the female produces 3,000 eggs daily. Skin irritations, coughing, asthma, afternoon fever, high eosinophilia and back aches signal these processes to the outer world.

Dammed-Up Lake as Disease Factor

Where, in the original landscape of the Volta Lake (Ghana) of today, only 1 percent of the population had been infected with schistosomiasis, after filling up the dammed-up lake it explosively afflicted 80 percent of the people who have settled along the shores. It was similar in the valley of the Nile. Before the Aswan Dam was built, the seasonal lowering and raising of the level of the Nile did not favor the snail population. Only 10 percent of the farmers suffered from schistosomiasis. Today, with a stable water level of the irrigated farmlands and a wide distribution of snails, it affects 80 percent of the farmers.

In addition to Lake Volta ($148 \times 10^9 \text{ m}^3$), and Lake Aswan ($164 \times 10^9 \text{ m}^3$), there are in Africa also Lake Cabora-Bassa ($159 \times 10^9 \text{ m}^3$), Lake Kariba ($160 \times 10^9 \text{ m}^3$), 12 additional dammed-up lakes with over 1 billion cubic meters, 14 with over 100 million cubic meters and another 69 smaller ones. In comparison, Lake Boden has a water mass of about 50 billion cubic meters. The first four of the dammed-up lakes listed have a total length of 1,360 kilometers corresponding to a more than 2,700 kilometer long shoreline. Currently the program has 90 more dammed-up lakes under construction or in the planning stage. Numerous new possibilities for settlements, with an increasing distribution of schistosomiasis, on the shores of these lakes and in the irrigation networks are already there or will present themselves.

Widely Compartmentalized Disease Spectrum

The schistosomes live in the venous system of man--*S. haematobium* (with exceptions) in the venous network of the lower urinary tract, *S. mansoni* and *S. japonicum* (with exceptions) in the veins of the middle intestinal section. Only a small fraction of the massive number of eggs laid succeeds in penetrating the venous wall with the help of histolytic enzymes and inflammatory processes. Those may reach the lumen of the bladder or of the intestine and be washed out. The disease producing agents of schistosomiasis are the eggs which remain in the body, produce chronic inflammations, are decomposed and are calcified. The symptoms correspond to these processes: with *S. haematobium* blood in the urine, bladder stones, calcification of the bladder wall, blockage of the ureter by granulomas (pseudotuberculosis) with subsequent hydronephrosis and severe kidney damage and, in still young males, bladder cancer. Boys pay little attention to bloody urine and look upon themselves as counterparts to menstruating girls. In females the cervix, vagina and vulva are also affected.

The leading symptom of *S. mansoni* and *S. japonicum* infection is diarrhea which can become like bloody-dysentery and resembles amoebic dysentery. In the advanced stage the following can arise: liver cirrhosis because of tissue changes, disturbances in portal circulation, portal blockage, ascites, hypertension, enlargement of the spleen, severe hemorrhages from esophageal varices and cardiac enlargement because of blockage of the lesser circulation. In Brazil, enlargement of the heart caused by *S. mansoni* has been found in 12 percent of the autopsies. In rare cases schistosome eggs can also get into the brain and spinal cord. The severe advanced cases of schistosomiasis are estimated to be 4 to 12 percent. Patients with chronic disease and few symptoms are retarded in development and are susceptible to secondary diseases (malaria, hookworm, amebiasis among others) until finally they become in part or totally disabled. Canal cleaners in particular belong to the group which makes up a great fraction of the mortalities. It is being attempted to explain the prevalence of the disease in males in terms of hormonal factors. When female mice with acute schistosomiasis are given anabolic steroids or male hormones, their mortality will be similar to that of male mice. In addition to the clinical symptoms and various serological tests, the demonstration of schistosome eggs in the feces or urine still remains the most reliable diagnosis.

Difficult Prevention

Chemical attack on the intermediary host, the fresh water snail, is considered to be the safest but, because of the high initial and pursuant costs, also the most expensive method requiring molluscicides, sprayers, transport equipment, supply storage, personnel, periodic evaluations. This is a burden which a Third World country cannot carry alone for the duration. The costs of a schistosome eradication program are calculated to be \$0.5 per head of population per annum, an amount which cannot be afforded by those developing nations who have at their disposal only 1 dollar per year for the individual inhabitants for the entire medical sector.

Experimental gains have been made with biological snail control using related rival species. For instance the snail *Marisa cornuarietis*, which eats small miracidia, is a ravenous feeder which takes away the food and also eradicates the eggs of its rival, *Biomphalaria glabrata* (host of *S. mansoni*). An intermittent water supply to rice fields instead of the current ponding decreases the snail population.

The building of latrines can strongly reduce the spreading of schistosome eggs. However, experience shows that such arrangements are very often not used by the population. Canals to supply clean water to households in order to keep the women away from stagnant waters and riverbanks would require an enormous amount of money because of the scale of the disease. In addition, watering sites in the Third World have always been the social gathering place of women, especially for the Moslems, who are not allowed to leave the house otherwise. The relocation of shoreline settlements further inland and the construction of village wells as a general measure

against the disease can also hardly be implemented for financial reasons. These and similar preventive arrangements are localized or topical measures. This means that WHO does not use the concept of "eradication" in the case of schistosomes because this is considered hopeless at the present time.

A natural immunity against reinfection appears to set in from about 35 years of age on because then the disease noticeably declines in people who otherwise have high resistance. Immunization attempts which have been carried out for years on Rhesus monkeys using fresh or irradiated cercaria, and also surgically implanted schistosome into the portal system, have not as yet led to encouraging results. Currently there are nine countries which introduced schistosomiasis legislation--Brazil, Chad, Niger, Egypt, Madagascar, Rhodesia, Senegal, the Philippines and Syria. The farmer who profits from an irrigation system is obligated to contribute to the snail control.

Significant Advances in Therapy

The earlier, laborious injection therapy with antimony compounds for a few weeks was unsatisfactory in part because of severe side effects. Therefore, the introduction of the Ciba product "Ambilhar" (Niridazol) in tablet form, which does not contain antimony, represented great advance. However it also had to be accepted with its occasionally considerable toxic symptoms (vertigo, nausea, cramps). Ambilhar cannot be used as a prophylactic. Further advance came with "Oxamniquin," available only recently, which is effective against *S. mansoni* in a single (oral or injected) dose. Children need a higher dose than adults which can be best administered in two parts with an interval of 6 to 8 hours. However, side-effects similar to those of Ambilhar therapy can also appear here.

A breakthrough appears to have been made with "Praziquantel" (still in an experimental stage) a single dose of which, in animal experiments, is highly effective against mature schistosome of at least six different species, among them especially against *S. haematobium*, *S. mansoni* and *S. japonicum*. In an extremely dilute solution of 0.01 to 0.1 mg/liter, Praziquantel kills miracidia and cercaria or paralyzes their living functions. Thereby the preparation is effective as a preventative against infection both of the intermediary host and of the final host. Even if it appears possible, in the near future, to give a single dose of a highly effective medicine against schistosomiasis, one still knows very little about a fully effective distribution system. The treatment of the age group most frequently infected by schistosome, children who can be reached at school, would not be sufficient to interrupt transfer of the disease, the less so because school enrollment is very much behind in the developing countries. Although alphabetization (schooling) is increasing in numbers in the Third World, these are relative and not absolute figures because the steady, strong population explosion leads to a steady increase in the number of illiterates. Since all types of schistosomiasis treatments are subject to reinfection, the control of this pestilence can have a chance of success only if, in addition to an effective, simple and affordable therapy, an equally effective education in hygiene could be implemented.

INDONESIA

GREAT SOLO RIVER WATER MONITORED TO PREVENT 'VIBRIO CHOLERA' POLLUTION

Jakarta KOMPAS in Indonesian 11 Aug 79 pp 1,10

[Text] The water of the Great Solo River along the areas of Bojonegoro and Lamongan Regencies, East Java, is now being monitored continuously to prevent the possibility of the rise of "Vibrio Cholera" pollution, a kind of germ which causes vomiting and diarrhea.

R. Soedarmadi Skm. M.D., head of the District Directorate of Prevention and Eradication of Contagious Diseases, Health Department, East Java, in his report given to KOMPAS Thursday, August 9, said that the water of the Great Solo River has been examined at the Health Laboratory and was declared to be positively containing the cholera germ.

He stated that the cholera epidemic in the Paciran District, Regency of Lamongan (KOMPAS, August 2) was caused by the utilization of the Great Solo River waters by the inhabitants along the river for their daily needs. The epidemic then continued to spread and affect 589 inhabitants in the sub-districts of Sekaran, Karangbinangun, Karanggeneng, Kalitengah and Laren.

The cholera epidemic in the Regency of Lamongan took a death toll of 16, among with eight did not have a chance to be taken to the Community Health Center for medical attention.

Before this case in Lamongan Regency, in Baureno sub-district, Regency of Bojonegoro last July, 172 people contracted cholera. But after examining them, 50 were treated with ringer lactat liquid and released. The cholera epidemic in the Regency of Baureno took seven people, who died before they were taken to the Community Health Center.

The areas in Baureno Regency are crossed by the Great Solo River. The inhabitants in the area usually also use the waters for their daily needs. We can therefore be sure that the germs which caused the cholera epidemic which affect the people in Lamongan Regency, originated from the Baureno area.

The areas in Lamongan Regency which have already been affected by the cholera epidemic have been sensitive to various other contagious diseases. This is caused by the scarcity of water during the dry season. The inhabitants are then forced to use water from the Great Solo River and the small lakes in the area for their daily needs.

INDONESIA

BRIEFS

KALIMANTAN CHOLERA OUTBREAK--Jakarta (AAP-Reuter).--A cholera outbreak in central Kalimantan had claimed 123 lives during the last three months, ANTARA news agency reported yesterday. The agency quoted an official of the local health service as saying that contamination of rivers flowing through the area in northern Borneo was responsible for the spread of the disease. ANTARA said military and civilian authorities in central Kalimantan had been ordered to assist villagers. The local health services had been equipped with 10 new riverboats to speed up help for the stricken areas. [Text] [Brisbane THE COURIER-MAIL in English 10 Sep 79 p 1]

CSO: 5400

KENYA

'WHO' DECLARES NATION FREE OF SMALLPOX

Nairobi Domestic Service in English 1800 GMT 22 Oct 79 LD

[Text] The WHO International Commission for certification of smallpox eradication in Kenya has formally submitted a draft report to the permanent secretary in the Ministry of Health, Mr Ondieki, in which they have declared Kenya free of smallpox. The secretary of the WHO International Commission for Smallpox Eradication in Kenya, Dr (Bassu), told Mr Ondieki today that all the requirements for this certification have been fully met by this country. Dr (Bassu) added that after a thorough examination of all the data obtained from the Commission's field visits, it has been determined that no transmission of smallpox has occurred in this country since February 1977. He added that Kenya has ample surveillance activities which would have detected any case of smallpox.

Mr Osogo, the minister for health, in a speech read on his behalf by the permanent secretary in the Ministry of Health, said that he was paying tribute to the members of the Commission for their committed recent efforts. The minister said that this country has learned a lot of techniques and approaches on how to control communicable diseases through the smallpox eradication program. He also thanked Wananchi for their efforts in working closely with the members of the Commission during their deliberations. Mr Osogo went on to say in his speech that 100 members of staff from the Ministry of Health had been recruited to work in the program and he said that within 3 years they have managed to give 9 million vaccinations.

According to a press statement from the Ministry of Health, Kenya, Ethiopia, Djibouti and Somalia will be the last countries in the world to be certified free of smallpox by 26th October. [sentence as heard]

CSO: 5400

BRIEFS

PARTIAL TETANUS VACCINATION STATISTICS--The anti-tetanus vaccination program began on 3 September is continuing in Greater Maputo, covering in its initial phase units of production of the Maputo, Matola and Machava industrial belt as well as schools in the capital. The program is aimed at providing protection against this disease to all workers and students. Up to last Wednesday the vaccination teams had vaccinated a total of 110,987 persons, among them 32,308 workers. This program will later be extended to rural areas, and more specifically to collective living and production centers. [Excerpt] [Maputo NOTICIAS in Portuguese 13 Oct 79 p 3]

CSO: 5400

BRIEFS

FARMER DIES OF RABIES--Cape Town: A South West African farmer who was bitten by his pet meercat died of rabies in a Cape Town hospital recently, it has been revealed here. The man, whose identity has not yet been released, was in his 50s. He was flown from an isolated farm to Cape Town for treatment and died at the Volkshospital on August 4. The Cape Town Medical Officer of Health, Dr R.J. Coogan, says the post-mortem established that the disease was rabies. "We suspected it was rabies soon after he arrived here but he was already very ill and died before we could confirm it," he said today. The man, who was bitten three weeks before his death, did not remember the incident when he was brought for treatment. "There was some doubt as to whether his wife had been scratched by the same cat, so we inoculated her as well," said Dr. Coogan. About 12 of the hospital staff who had come into contact with the man were also inoculated. "Although all rabies cases have been contracted from bites by a rabid animal it is theoretically possible for it to spread through contact with an infected person." "We inoculated the staff as soon as the findings became known, and there is definitely no possibility of their having caught or transmitted it." Dr Coogan said that in spite of a number of rabies scares in the country, this death was the first in many years.--Sapa [Text] [Windhoek THE WINDHOEK ADVERTISER in English 15 Oct 79 p 3]

CSO: 5400

CONFERENCE ON IMMUNIZATION HELD IN KADUNA

Kaduna NEW NIGERIAN in English 21 Sep 79 p 16

[Article by Michael Reis]

[Text]

OVER two million vaccines have been acquired by the Kaduna State Government for the treatment and prevention of various diseases in the state.

Also, between April and June this year, more than 80,000 people were vaccinated against various epidemiological diseases.

These facts were made known yesterday by the Permanent Secretary in the state Ministry of Health and Social Welfare, Dr. D.S. Tafida, while addressing delegates to the two-day conference on immunisation against diseases at Durbar Hotel, Kaduna.

Giving a break down of the people vaccinated in the state, Dr. Tafida said that about 15,000 children of between six months and 15 years were vaccinated against cerebro spinal meningitis while 27,000 others were vaccinated against oral poisoning.

He added that about 18,000 children were vaccinated against measles, 1,700 against yellow fever while a similar number of people were vaccinated against rabies and tetanus. The exercise, he said, was a continuous process.

Dr. Tafida expressed great appreciation at the interest shown by the state and federal governments towards the immunisation programmes.

He said that it was because of the awareness of the governments

that the prevention of a disease was better than its cure as a result much time and money had been devoted to various immunisation programmes.

He urged delegates at the conference to deliberate seriously on ways of keeping proper medical records and statistics in order to ensure steady progress in the crusade to eradicate diseases in the country.

Only these vital documents, he said, could show the rate of occurrences of diseases and under what circumstances they thrived.

Dr. Tafida also told the delegates to consider and put out suggestions on ways drugs could be stored in the country.

He noted that because of poor storage, imported drugs worth millions of Naira had gone bad in most of our hospitals.

Dr. Tafida pointed out that it was not enough to assume that imported drugs which mostly carry the inscription that they could be stored under "room temperatures" could also apply to the environment here considering the differences in climatic conditions of the areas.

"Something positive must be done on ways of the storage of drugs", he emphasized.

He then wished the delegates a peaceful deliberation and also told them to come out with new ideas on ways to combat diseases in the country.

NEW LABORATORY CAN HANDLE CLASS 4 VIRUSES

Johannesburg THE STAR in English 20 Sep 79 p 2

[Article by Rob Taylor]

[Text]

SOUTH Africa, with its medical manpower and technology, is the one country in Africa which could probably make the greatest contribution in the field of virology, the Minister of Health, Dr L A P A Munnik, said yesterday.

Opening the new P4 containment laboratory at the National Institute for Virology in Sandringham, Johannesburg, Dr Munnik said that with ever-increasing virus epidemiological evidence, the medical world faced an on-going problem.

"The Department of Health was therefore prompted to institute a fever programme consisting of two parts.

"The first was the institution of a haemorrhagic fever team and the second this new laboratory we are opening here today," he said.

"Without quick and adequate diagnosis made in a safe working environment, we are powerless to know what we are dealing with and to plan our approach to the outbreaks and the long-term epidemiological problems."

He added that the construction and operation of the laboratory would not create a danger to the surroundings.

The new laboratory, costing about R736 000 without equipment, is the only one in Africa and one of five in the world which is fully equipped to handle Class 4 viruses in safety.

Examples of Class 4 viruses which are deadly to man — either because they are not treatable or because there is no known immunisation against them — are Marburg and Lassa fever.

CS0: 5400

STATUS OF ANTIDISEASE FIGHT REPORTED

Kinshasa ELIMA in French 14 Sep 79 p 1,7

[Text] The last two rounds of questions that journalists asked Dr Comlan A.A. Quenum, regional director for Africa of the World Health Organization, concerned the fight against disease and medical research and training. Comrade Ngoma, of Congolese television, summed up the numerous questions of his colleagues from other countries in the region by asking the reasons for the reappearance of trypanosomiasis, considered recently as an eradicated disease. During his turn, citizen Lumeto of the Voice of Zaire asked whether Dr Quenum was not discouraged by the "politics" of the leaders of member countries of the region.

Responding to all the questions, Dr Quenum retraced the steps that the organization has taken in its fight against these diseases during his 15-year mandate. Thanks to these efforts, he said, smallpox is considered eradicated. And its eradication is one of the most outstanding accomplishments of the decade now closing. Also, continued Dr Quenum, considerable progress has been made during the last few years in the field of research on the principal endemic diseases and in the strategies of fighting the transmissible diseases.

However, there are still no vaccines and no efficient medications to treat the parasitic diseases which take a large human toll each year and which incapacitates millions of people. Dr Quenum finally affirmed that the fight against insect vectors is ineffective and has gone beyond the means of the member states.

Malaria is still considered a serious problem in the region. On this subject, the regional director stated that the most intensive research on this disease has produced positive results. But for successful results, he added, the programs for fighting against malaria require a functional health infrastructure and a coverage appropriate for the region. However, he noted that financial constraints prevent the countries from acting accordingly. Speaking about the new incursions of cholera in the region, the speaker said that this disease is due to an unhealthy environment and especially to nonpotable water.

Because of the conditions which prevail in numerous countries, it spreads rapidly.

With respect to the fight against onchoceroses, Dr Quenum declared that the progress made in this area in the Volta basin are satisfactory. He added that, mindful of the experience already obtained, the studies made prior to the expansion of the program were undertaken in western Mali and in the Senegal river basin.

In addition, Nigeria, in collaboration with WHO, is preparing its own program whose first objective will be the protection of the region which surrounds the new federal capital.

In response to the question of citizen Ngoma concerning the resurgence of sleeping sickness, the speaker said that the reappearance of this sickness was caused by the deterioration of living conditions.

In answer to the question on the training of medical personnel, the WHO regional director emphasized that one of the surest means of obtaining the social objective that WHO established for itself is by giving medical personnel adequate training. Because, he added, we can expect no progress in the area of health care if member states continue to employ incompetent personnel. In order to take up this new challenge, health services must reconsider their training programs and make sure that they are better adapted to local conditions.

After his concluding remarks, Dr Quenum listened to the speaker for the journalists present, citizen Mbaya Kabunda, who appraised this meeting with him and recalled the efforts Dr Quenum made during his mandate for the development of health in the African region. The 29th session of the regional committee, which will be held in Maputo, will have the additional task of electing a replacement for Dr Quenum.

9128

CSO: 5400

ANTITUBERCULOSIS VACCINATIONS, MEDICINES DISTRIBUTED

Lubumbashi MJUMBE: LE QUOTIDIEN DU SHABA in French 30 Jul 79 p 5

[Text] An antituberculosis campaign for the population of Mulowenu recently started in this settlement located 27 km from Musokatanda and 15 km from the Zambian border.

Members of the United Nations' High Commission for Refugees initiated the campaign in collaboration with a mobile unit of physicians from the sub-region of Kolwezi and from the Red Cross of Zaire, after several cases of this disease were observed in this locality inhabited mostly by Zambian refugees.

The mission's primary goal is still the distribution of medicines and essential agricultural materials to the populations which are suffering from the painful events caused by the Katangan ex-gendarmes in the area of Mutshatsha. This operation of help coincided with the road campaign for sensitizing the masses which citizen Issa, Sub-regional Commissar, undertook across the Mutshatsha zone, that is, in the border regions of Mushima and Musokatanda. In this road campaign citizen Issa, who accompanied citizen Seya Kabwese Mulunga, Commissar of the Mutshatsha zone, held popular meetings asking the population to maintain their confidence in Guide Mobitu. He also emphasized that the jest of the United Nations' High Commission, in accordance with the Department of Health, constitutes a real security which the president-founder of the MPR is trying to establish for the Zairian population.

In addition, the sub-regional coordinator of MPR activities emphasized the need for the special Salongo in order to construct housing in a decent manner, to grant them a clinic and a school building for their children.

The Kolwezi representative emphasized that the region could thus supply medications for the clinic and sheet metal for the roof of the primary school.

9128

CSO: 5400

GONORRHEA EPIDEMIC IN LUBUMBASHI

Lubumbashi MJUMBE: LE QUOTIDIEN DU SHABA in French 31 Jul- 1 Aug 79 p 8

[Article by Bukasa Mulumba Boni: "Gonorrhea Plagues Lubumbashi"]

[Excerpts] We sincerely hope our readers will excuse us for this frightful topic. Discussing the problem of a disease such as this is not plausible for certain people. But considering the phase (1st stage) that this epidemic has already attained, we can not help but talk about it because we, in our own way, want to combat it.

Above all, let us try to see from the medical point of view just what this disease, gonorrhea, consists of.

Gonorrhea, which is very contagious, most often follows venereal contact. And herein lies our concern, because we are obliged to state that almost all the women described as "free" have this disease, at least the women here in Lubumbashi.

We would like to remind our readers that we, in no way, wish to discredit the women of Zaire to whom we owe much respect. On the contrary, for our greatest desire is to get rid of this plague.

In conclusion, we would like to remind the public that there is a Prophylactic Service here in Lubumbashi where all persons who suspect they have this disease can consult a physician. The medication and treatment which are given after the examination are nearly free, paid in large part by the state. It is thus in one's interest to consult with the medical personnel there each time one suspects anomalies. Otherwise we implore the service to fine each single woman who does not have a card from the health facilities.

9128

CSO: 5400

MEASLES KILLS 50 CHILDREN IN SENANGA

Lusaka TIMES OF ZAMBIA in English 7 Oct 79 p 1

[Article by Dennis Kapata]

[Text]

MORE than 50 children died in Senanga District last month after an outbreak of measles, the governor, Mr Samuel Wamuwi, has reported.

Speaking in Senanga yesterday, Mr Wamuwi said an unspecified number of adults and children had died of meningitis during the same period.

The deaths occurred in Sipuma area which lies between Kaungamashi and Shangombo near the Angolan border.

The governor, just back from the affected areas, said he feared the number of children who died from measles could be higher because some of the deaths were not reported or recorded.

He attributed the deaths to what he said was a limited number of health facilities in the area. There was also lack of transport to take health personnel to immunise people in the villages.

He said: "Our major problem here is lack of medical facilities, especially in remote

parts of the district. Only a few villages are accessible to medical care."

He added that the situation was aggravated by the fact that the district hospital, which was inadequate, had no dependable vehicle which could go in rural areas to pick up the sick.

"Rural health centres are very few in the district and that is why people are dying due to lack of medical attention," he said.

He said, however, that a health team headed by the district health inspector would leave for an immunisation campaign in the remote parts of the area immediately he secured transport.

Meanwhile, Mr Wamuwi said that famine was imminent in some parts of the district following a drought being experienced in the area.

During his tour of the district, Mr Wamuwi discovered

that three areas were already facing a critical shortage of food. These were Nambwayi, Silwana and Sinjembela.

"I am in the process of compiling a list of villages which will need famine relief so that we can establish depots where villagers can buy maize," he said.

Mr Wamuwi said he had already informed high authorities in Mongu about the impending famine.

In Kaoma, governor for the area, Mr Andrew Kawonga, described congestion at the district hospital as "worse."

Mr Kawonga however said the hospital had now a doctor after operating without one for more than six months.

Because of congestion, the hospital held its under-five clinic demonstrations under a mango tree.

FOOT-AND-MOUTH ECONOMIC LOSSES REPORTED

Gaborone DAILY NEWS in English 21 Sep 79 p 1

[Text]

The Botswana Meat Commission lost P14 899 000 from sale of cattle products between 1977 and 1978 due to the foot and mouth outbreak.

The Commission's latest annual report indicates that its turnover fell from P53 182 000 in 1977 to P38 283 000 last year. The report adds that due to cattle movement restrictions following the discovery of the foot and mouth outbreak in 1977, the BMC slaughtered only 149 348 cattle last year, compared to 197 850 cattle killed during the previous year. During 1978, the last normal kill year for the Commission, 211 987 cattle were slaughtered.

The report says that the BMC Board reduced the price payable to producers by 10 per cent as against the 20 per cent which was anticipated at the beginning of this year, when the outlook was very bleak. This then made the average producer price per head to be fixed at slightly over P145 last year, compared to P155 in 1977.

According to the BMC report, the average cold storage weight was 204 kilogrammes per head compared to 208 kilogrammes the previous year. The supply of smallstock dropped tremendously in 1978, the report says.

It adds: "Only 323 goats and 440 sheep were slaughtered, compared with 3 533 and 1 910 respectively in 1977. There is, as yet, no consensus amongst livestock specialists in the Ministry of Agriculture as to the reason for the decline."

The report explains that during last year, the Botswana beef industry experienced the full effects of foot and mouth outbreak. And when the kill was resumed early this year, Botswana's main European Community market, the United Kingdom, was still closed to the beef.

"However, it had been possible to send some significant tonnage to France until May, when that market was closed to our beef," the report says. In the first half of 1978, therefore, the BMC had to depend on markets of lower returns than the EEC for the disposal of its products, it adds.

According to the report, the EEC resolved in July to allow meat from animals in the southern part of Botswana to be exported to the United Kingdom and to the French Overseas Territories and Departments.

This decision came rather late since cattle in stipulated areas had already been killed during the first half of the year. Botswana had to continue pleading to the EEC to have other disease-free areas opened. This was agreed upon in November.

As a result the report says, limited tonnages were sold to France Reunion, and Britain, which realised good returns. The situation, coupled with the then improving trend in world market prices, made the year, which had started most pessimistically end on a more hopeful note.

The BMC report says that prices for all by-products improved throughout the year, with a particular advance in the hide prices, which showed improvements of up to 50 per cent. Various items were sold to Zambia, Mozambique, South Africa, Japan, Denmark and Germany.

The report explains that newcomers to the Commission's revenue this year are ECCO Corned beef from the Cannery and the wet blue hides from the new Tannery. According to the report, both these products have been well received in world markets and expectations for the future are high.

It says that by the end of year, full production at the Cannery, which together with the Tannery were opened last year, had been

achieved at the rate of over 150 000 000 cans a week. At this rate, the cannery uses approximately 100 tonnes of meat a week.

The report explains that the tannery reached full production by dealing with 2 600 hides weekly. According to the report, the two grazer schemes continue to be popular. Of particular interest is the female breeding scheme which has been exceptionally welcomed by small farmers.

Although allocations were suspended after the outbreak, the BMC latest report explains, applications continued to be received and processed to await the time when the Board would resume allocations.

It adds that it is hoped that the achievements made by the end of the year in the fight against foot and mouth outbreak, will enable resumption of allocations during 1979.

The report shows an intensive staff training programme of Batswana who would work in various departments of the Commission after completion of their courses. The training courses, varying in durations, are undertaken both within and outside Botswana.

CS0: 5400

PROGRESS OF ANTIRABIES CAMPAIGN REPORTED

Yaounde CAMEROON TRIBUNE in French 26-27 Aug 79 p 6

[Text] The Zootechnical and Veterinary Center of Ebolowa recently published a report of its activities during the 1978/79 exercise. The report, which concerns the towns of Ambam and Ebolowa, states that 2,156 bovine carcasses were inspected and 337 pig carcasses. Four cases of generalized tuberculosis and several cases of partial tuberculosis were detected. During this exercise, it was noted that, apart from lacking a carrier, which plagues the center, the local populations are still unaware of the fact that, while raising their herds, they have made gains in agriculture. An extensive 3-month antirabies vaccination campaign was nevertheless undertaken throughout the Ntem Department.

The campaign resulted in the vaccination of 400 dogs at a total cost of 160,000 CFA francs. The authorities also participated in the same exercise. They initiated the control of rabid animals which wandered in the towns and villages.

As a result of the endowment of Credit-Fonader, more than ten farmers benefited during the 1978-79 exercise in the Ntem Department. And the competition for outstanding animal raising that same year permitted the technicians of the zootechnical center to examine the entire Ntem Department for farms which were to participate in this competition and to discover a good number of farms in the villages.

Much advice was given the developers of these farms at this time. The zootechnical center of Ebolowa will conduct the same program of activities for the 1979/80 exercise.

9128

CSO: 5400

BRIEFS

AFRICAN RIFT FEVER--The agriculture ministry intends to begin carrying out wide-scale searches for smuggled herds in the Gaza Strip that have not been immunized against African Rift Fever. Our correspondent says that it is suspected that, such herds are found mainly in the area bordering on the Suez Canal. In the last few months, approximately 200,000 head of cattle, sheep and camels from the Gaza Strip and the Sinai have been immunized against the disease. [Text] [Jerusalem Domestic Service in Hebrew 1300 GMT 12 Oct 79 TA]

CSO: 5300

BRIEFS

RABIES OUTBREAK IN SOUTH NYANZA—An outbreak of rabbies has been confirmed in Bwirege Location in South Nyanza District. The District Veterinary Officer Dr. H. T. Otieno has imposed a quarantine notice on Kihancha Division requiring dogs and cattle to be detained in the division. He appealed to the people to co-operate with his office by reporting cases of dogs which behave in an unusual manner. Dog owners should present their dogs for vaccination and confine them within their premises, he said. Dr. Otieno said that anybody bitten by a dog should report to the nearest health centre for treatment and in case a dog is killed its carcasses should be handed over to the veterinary officials for a post-mortem. Dr. Otieno was addressing a department heads meeting which was chaired by the new South Nyanza District Commissioner Mr. Ezekiel Nyarangi at Macalder. [Text]
[Nairobi SUNDAY NATION in English 7 Oct 79 p 3]

CSO: 5400

MOZAMBIQUE

MEASURES ADOPTED AGAINST AFRICAN SWINE FEVER OUTBREAK

Maputo NOTICIAS in Portuguese 22 Sep 79 pp 3, 6

/Excerpts/ After a 10-year lapse, African swine fever has again broken out in the Sofala province, specifically in the Beira and Dondo districts, where it has assumed proportions which are peculiar to it, in other words, possessing a marked tendency to spread and distinguished by a very high death rate among swine.

In this case, although the disease had already broken out some days ago, it was not possible to identify it until the 13th of this month, through a laboratory diagnosis technically known as indirect immunofluorescence. However, that particular epidemic is now confined to very specific areas and is under the control of the Provincial Department of Agriculture in this province.

While stating that this disease attacks only swine and is not transmissible to man, it is also pointed out that the flesh of sick animals is not edible precisely because of the characteristics peculiar to it.

In order to control and eradicate African swine fever--according to an official notice from the National Department of Animal Husbandry--immediate measures have been adopted with the main objective of neutralizing existing infected areas, taking the necessary precautions with the pigsties which are threatened but not yet infected and at the same time, as an urgent measure, banning the passage of swine, their products and by-products to or from the affected areas. For this purpose, they have set up compulsory control and disinfection stations within the limits of Beira and the Sofala province.

On the other hand, according to the National Department report, they are subjecting the infected pigsties where the disease is now under control to a rigorous disinfection process and have closed them down throughout the quarantine period.

"They are recommending these and other measures in order to prevent the spread of the disease," the official document emphasized at a given point, "and the invasion of the African swine fever virus in the area."

Characteristics of the Disease

According to the National Department of Animal Husbandry, in order to see the development of hog raising in the Sofala province in its proper perspective, a great deal has to be done in the area of organizing the protection of this animal species by establishing as quickly as possible the proper hygienic standards in order to prevent the invasion of disease and at the same time to assure its effective control.

"One important factor, of a political nature, in other words, man and his organized production, can, in a positive sense, decisively change the existing balance between agent--host--environment. The organization of swine production is also reflected in the improvement and reduction in the risk of transmission of other diseases to man" that agency made clear.

Referring to the characteristics of the African swine fever, the National Department of Animal Husbandry mentioned that the sources of the disease are, as a rule, the wild swine family, which are almost always carriers of the disease, and infected hogs--sick or recovering from the disease.

It is on record that the African swine fever in Mozambique is endemic in the Angonia district (Tete province), and that infected centers have already appeared in the Sofala (1967-69) and Nampula (1972) provinces.

8870

CSO: 5400

REPORTAGE ON INCIDENCE, PREVENTION OF ANTHRAX

Shortage of Vaccine

Salisbury THE HERALD in English 13 Oct 79 p 3

[Text]

THERE is a shortage of anthrax vaccine in the country, a spokesman for the Department of Veterinary Services told an executive meeting of the Midland branch of the Commercial Farmers' Union in Gwelo yesterday.

The Midlands Province could use another 100 000 doses in the near future, the spokesman said, and already a waiting list of farmers wanting vaccine has started.

Since the present outbreak started in Nkai, on the border of Midlands, in January more than 104 000 doses of vaccine have been distributed.

More supplies are expected shortly. Tribal farmers and their dependants seem to be becoming aware of the problem and with at least 30 people having died from the

disease, seem to be reluctant to eat meat from dead animals. It was reported at the meeting that the carcasses of cattle killed on commercial farms were being left alone.

THEFTS

However, the risk of anthrax does not seem to be having any effect on the numbers of cattle being stolen.

The farmers in the three Midlands TTAs where, with Nkai, the disease seems confined to, are starting to inoculate their herds. When available, the vaccine is cheap, costing about 65 cents for 100 doses.

Death Toll Now 21

Salisbury THE SUNDAY MAIL in English 14 Oct 79 p 4

[Text]

THE anthrax outbreak in the Midlands and Matabeleland claimed another life last week, as reported cases continued to mount, but Department of Veterinary Services officials were

hopeful the problem would lessen after the rains begin.

The death toll now stands at 21. A Health Department spokesman said last week an additional

54 people had been treated, most of them in Matabeleland, bringing the total number of reported cases to more than 550.

"I think that once the rains come the deaths will

stop," said Dr Allan Hurrell, assistant director of the Department of Veterinary Services.

"The anthrax spores will be washed into cracks and rivers and no longer be a problem. This is not to say that it will disappear altogether, but the danger will ease greatly."

The outbreak of anthrax began among cattle in January. The first cases involving humans were reported about six months ago.

Normally anthrax is easily controlled, but Department of Veterinary Services attempts to vaccinate the herds in the affected Nkai and Slobela Tribal Trust Lands have been frustrated by terrorist activity.

Any warm - blooded animal can contract anthrax.

Between 1968 and 1978 there were 75 reported cases in humans in the tribal trust lands. Of these, six resulted in death.

CSO: 5400

FARMERS FLOCK TO BUY ANTHRAX VACCINE

Salisbury THE HERALD in English 17 Oct 79 p 4

[Text] THE Department of Veterinary Services in Bulawayo was jammed with farmers buying anti-anthrax vaccine yesterday.

"The 50 000 doses flown to us last weekend are all gone, but another 100 000 are on the way," a spokesman for the department said.

In an unprecedented rush for the vaccine, about 40 farmers called at the department offices and another 40 or 50 telephoned.

"We sold 40 000 doses and have opened a waiting list for farmers we could not supply," the spokesman said.

Teams will go out to the Fingo Location,

Ntabazinduna and Mziyathini Tribal Trust Lands on Thursday and Friday, to vaccinate tribesmen's cattle.

"We put 10 000 doses aside for this campaign," the spokesman said.

Yesterday farmers in the areas nearest to the tribal trust lands where anthrax has occurred were supplied first. Others were put on the waiting list.

"There is obvious concern among farmers over this latest outbreak, which has added yet another problem to the many with

which they are contending," he said.

"Fortunately, they can do something about anthrax. It is understandable that they want to do this quickly."

"I do not believe the disease will spread to any significant extent, into the commercial farming area. We are going into the infected areas and vaccinating."

"Our experience is that where we do this the deaths cease within a couple of weeks," the spokesman said.

Eat 'Safe' Meat Warning

THE Department of Veterinary Services has warned the public against eating the meat of animals that have died or have been killed because of sickness and against buying meat from unknown sources, to avoid the risk of contracting anthrax.

In a statement in Salisbury yesterday, the department said to date 21 people have died and more than 500 have been treated for anthrax, a disease contracted by handling or eating infected meat.

The department urged stockowners to produce their cattle for vaccination when requested, while those in affected areas were advised to notify their nearest veterinary office.

Individual stockowners could buy vaccine costing 63 cents for 100 doses from their nearest veterinary office.

The statement added that meat from established abattoirs was "quite safe".

NEW PRODUCT FOR BANANA PLANTAIN PARASITES BOUGHT

Yaounde CAMEROON TRIBUNE in French 12 Sep 79 p 6

[Text] The often toxic products used to combat plant parasites are often used incorrectly by agricultural technicians in charge of planters. Thus in order to receive detailed explanations on the use of the new product "Furadan," chief agricultural officers and agricultural monitors met recently in Ngomedzap and Mbalmayo with a representative of the company that developed this product, the Society of Chemical Products of Africa (SEPCA). Furadan is a chemical product designed to rid cultivations of nematodes. The representative of SEPCA developed his theoretical explanations from practical experiences against the parasites of the banana plantain. After informative sessions, which have already been held in several administrative units of the department, the chief agricultural officers and agricultural monitors were asked to hold similar sessions with planters in order to popularize the use of this dangerous product.

To facilitate the planters' purchasing of this product, the participants of the meetings in Ngomedzap and Mbalmayo suggested that depots for the sale of this product should be created at the departmental commission of agriculture in Mbalmayo and at each agricultural post.

The cooperation of the populations of the Nyong-et-So'o Department concerning the cultivation of the banana plantain was evident. In fact, because of Fonader financing, MIDEVIV, and their personal efforts, 102 ha of banana plants were planted in 1978/79 as compared to 35.5 ha in 1977/78. There is every reason to believe that this increase will soon double, if SEPCA promotes the use of Furadan throughout the department.

9128

CSO: 5400

NIGERIA

OFFICIAL URGES OAU COOPERATION IN FIGHTING PESTS

Lagis DAILY TIMES in English 20 Sep 79 p 5

[Text] Nigeria has urged member states of the Organisation of African Unity to co-operate in combating dangerous diseases and pests to boost agricultural production in the continent.

The director of the Federal Department of Agriculture, Alhaji M. Liman, said co-operation was necessary since such pests abound all over the world without recognising political boundaries.

Alhaji Liman made the appeal on Monday in Ibadan, in an address read at the opening ceremony of the fifth international plant quarantine course.

He urged OAU member countries to complement their agricultural development programmes by exchange and introduction of improved crop germ-plasm.

He observed that the Federal Government and other member states of the OAU had long recognised the need for international co-operation in settling up plant quarantine organisations.

Alhaji Liman said no single country could afford to go it alone on quarantine matters not only for the high costs involved but also for the specialized personnel and high degree of uniformity required.

In his address, the executive secretary of the scientific technical, research commission of the OAU, Mr. Amos Oyetunji Odelola noted that in spite of the tremendous advances science had made in crop production, Africa still remains one of the poorest producers of food crops.

He advised that while crop production methods were being improved, attention should also be focused on ways to control pests and diseases.

He disclosed that since 1972, when the Ibadan centre was set up it had trained 41 senior phytosanitary inspectors drawn from 14 African states at international level and 120 junior inspectors at the national level.

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